State Road Transport Undertakings of India: An Analysis of Operational and Financial Performance

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1. Introduction

Transportation is the movement of people, animals or goods from one location to another. Each and every activity happening in this world is connected to transportation in one way or another. It reaches into every phase and facet of our existence(Koshal & Koshal, 1989). The necessities and pleasures required by people, will not be available within the vicinity of their static bodies from their birth to death. So either people have to move towards the necessities and pleasures or the necessities and pleasures should be moved towards them. Therefore transportation is inevitable for meeting various requirements of life.

Transportation is of unimaginable importance to the world. A well-constructed and coordinated system of transportation has an important role to play in the sustained economic growth of a country (Vijayan, 2014). Access to transport services is considered critical for addressing equity concerns by facilitating access to primary education and employment generation facilities. Transport infrastructure enables the supply of goods and services around the world and allows people to interact, trade and generate the knowledge and solutions that foster long-term growth. Transport promotes opportunities for the poor and helps in integrating rural communities in the socioeconomic structure of the nation(Deb & Filippini, 2013).

Transportation can be done through land, air or water. Land transportation is the most common mode of all. It is the movement of people, animals or goods on the land. Air transport is the transportation through air using machines that fly. Maritime transport or water transport is the transportation in water using floating or submerging watercrafts.

Transportation can either be private or public. Private transport are those facilities or services which are not available for use to the general public. Private transport facilities or services can only be utilised by the owner of such a facility and by those individuals who are permitted by the owner. Private transport is the most dominant form of transport in the world. Public transport, on the other hand, is the transport of passengers by group travel systems available for use to the general public. These systems are typically managed on a schedule, operated on established routes, and charge a predetermined fare for each trip. Modes of public transport include city buses,

trolleybuses, trams, passenger trains, rapid transit (metro, subway, underground etc.), ferries, auto rickshaws, taxis etc.

The demand for transport services and infrastructure soars as nations develop. The case of India is no different. In India, especially after the economic liberalisation reforms, the growing economy has triggered a huge rise in demand for transport services and infrastructure. However, the Indian transport sector was unable to catch up with the massive demands of the nation. The transport systems in India are plagued by chronic corruption and inefficiency, with overcrowded and undependable services. The congested and unmaintained roadways slow down vehicles, and the operating environment is chaotic and completely uncoordinated (Pucher, Korattyswaroopam, & Ittyerah, 2004). Mass transit is regarded as the best option for alleviating many current problems such as energy shortages, traffic congestion, air pollution and urban decline. But mass public transit, in general, is of poor quality, produced inefficiently and requires increasing subsidies (Berechman, 1983). The terrible state of the transport sector is inhibiting the Indian economy to thrust forward in its full potential. So, significant improvements in the sector is indispensable to support the country's continued overall progress.

Indian railway is one of the largest and busiest rail networks in the world. With 7,349 railway stations over a total route length of 67,368 km and track length of about 93,902 kilometers, the Indian railway covers the length and breadth of the country. It carries over 18 million passengers and more than 2 million tons of freight daily (Ministry of Railway, 2018). The Indian aviation sector is also very strong. About 183.90 million passengers; both domestic and international, used the aviation services in 2017-18 alone. Air cargo carried by scheduled airline operators in 2017-18, accounted to 9.25 metric tons in domestic flights and 14.61 metric tons in international flights (Directorate General of Civil Aviation, 2018). With a long coastline of 7,517 kilometers and an extensive network of inland waterways with a total navigable length of 14,500 kilometers, India is a nation that can really make use of its water resources for transportation purposes. In India, about 95 per cent of the foreign trade by quantity and 70 per cent by value takes place through the ports. When compared to other large countries, the transportation by waterways is highly under-utilised in India.

However, road transport is the dominant mode of transport in India, in terms of traffic share and also in terms of contribution to the national economy. Features like accessibility, flexibility of

operations, door-to-door service and reliability have made road transport the ideal option in both passenger and freight traffic. Road transport carries about 90 per cent of the total passenger traffic and 67 per cent of the total freight traffic. Sustained economic development and expanding road network have led to a steady increase in the number of motorised vehicles in India. The total number of registered motor vehicles has increased from about 0.3 million in 1951 to 230 million in 2016; recording a growth rate of about 10.7 per cent, annually (Ministry of Road Transport and Highways, 2018).

Public transport is the primary mode of transport for majority of Indian citizens. It is one of the most heavily used public transport systems in the world. 50.4 per cent of the Indian citizens belong to or is below the 'lower - middle income class' group whose per day per capita income is up to US $3.20 (World Bank, 2018). This single statistic put forward by the World Bank is enough to explain why Indian citizens depend too much on the public transport systems of the nation. India has a vast network of public transport. Public transport facilities are available on land, in water as well as in air. The main public transport facilities available on land are bus-based transport systems, the Indian railway, trams, metros, taxis, auto rickshaws etc. India also has a substantial system of inland waterways. Ships, boats, ferries, barges etc. carry passengers and goods through the waterways. The Indian aviation sector is also strong with about 449 airports and more than 12 domestic and international operators. However, the most popular of these is the bus-based public transport system.

Bus-based public transport system provides mobility to people in a cost effective manner. Bus transport makes the most optimum use of the available road space and fossil fuel by transporting the maximum number of people per unit of road space and passenger kilometer/liter of fuel. In urban and metro cities, bus-based public transport system offers a viable solution to the enormous problems of traffic congestion and pollution, and in rural areas it provides an affordable and convenient means to transport people and goods. Passenger transportation has both private operators and public operators, which are called state road transport undertakings (SRTUs). In most Indian states, bus-based public transport is dominated by SRTUs in terms of both coverage and patronage (Ministry of Road Transport and Highways, 2018).

SRTUs are the public transport undertakings set up in accordance with the Road Transport Corporations (RTC) Act, 1950. The RTC Act, 1950 was amended in 1956 to incorporate special provisions for the SRTUs. The Government of India included road transport in the list of industries to be progressively nationalised under the Industrial Policy Resolution (IPR) Act, 1956. The recommendations made by the various committees appointed by the Government, the various amendments made in the RTC Act, 1956 and the encouragement given by the planning commission resulted in the formation of various SRTUs in the country under four forms; (a) Departmental undertaking directly under the state government, (b) Municipal undertakings owned and controlled by the municipal corporations, (c) Companies or corporations formed under the Indian Companies Act 1956 and (d) Road transport corporations formed under the RTC Act 1950.

The Association of State Road Transport Undertakings (ASRTU) came into formal existence on 13th August, 1965. The aim of ASRTU is to bring together all SRTUs on a common platform to pool their resources and know-how for dealing with various problems faced by them and to help them improve their performance. In 1967, the Central Institute of Road Transport (CIRT) was established on the joint initiative of the Ministry of Shipping and Transport and ASRTU. CIRT is the training and research wing of ASRTU. The emphasis of CIRT is on improving the efficiency & productivity of the transport sector, with particular emphasis on the SRTUs. CIRT compiles and publishes comprehensive statistics on the financial and physical performance of the SRTUs every year.

In India, there are currently 54 SRTUs operating in different states comprising of 24 State Road Transport Corporations (SRTCs), 12 companies, 10 municipal undertakings and 8 Government departmental undertakings. Out of these 54 SRTUs, 47 SRTUs have reported their physical and financial performance parameters to the Transport Research Wing (TRW) of the Ministry of Road Transport & Highways (MoRTH), for the financial year 2015-16. A staggering 40 SRTUs out of the 47 SRTUs who reported their performance parameters, have reported to have incurred losses. The 47 SRTUs reported a combined net loss of Rs. 1,13,497.8 million in 2015-16 which is 7 per cent higher than the net loss of Rs. 1,05,879.8 million for 2014-15. If the profit made by the 7 SRTUs are taken out of the picture, the 40 loss making SRTUs have incurred a loss of Rs. 1,14,413.93 million in 2015-16 alone. And hence this research.

The element of social service has always been present in public transport operations. Having to operate in commercially unprofitable routes, at controlled fare levels does take a toll on the profitability of public transport undertakings (Bly, 1987). However, rationalisation of such huge losses with the argument of social service is unacceptable. Such massive losses point towards possible inefficiencies existing in the management and operational systems. So through this research, I intend to find out the principal reasons for the unwelcome financial performances of the SRTUs in India. The effect of the capital structure on the financial performance of SRTUs is aimed to be examined. I also aspire to measure the efficiency and productivity of various components of SRTUs namely labour, bus, material and fuel, and to study the implications each one of them have on the financial performance of the SRTUs. It is also planned to do the cost analysis of the SRTUs. The outcomes of this research will be helpful for providing deep insights for the management of SRTUs in order to make alterations to the current way of operations. The findings will also prove instrumental for decision making and planning for the future.

2. Review of Literature

This section is divided into five sub sections. The existing literature on financial performance and profitability is discussed in the first sub section. It is followed by the discussion of literature on productivity in the next sub section. In the third sub section, the literature on efficiency is reviewed. Fourth sub section includes the discussion of literature on cost analysis. It is succeeded by discussion regarding literature on capital structure and its effect on the financial performance in the final sub section. All aforementioned themes are discussed with a special emphasis to road transport undertakings.

2.1 Literature on Financial Performance and Profitability

The literal meaning of financial performance is performing financial activities. However, in a broader sense, financial performance refers to the degree to which financial objectives has been or is being accomplished. In other words, financial performance is the process of measuring the results of a firm's or an entity's policies and operations in monetary terms. A cross-sectional study on the profits of non-municipal public bus operators was undertaken by Beesley & Politi (1969). They analysed bus operators' performance data pertaining to four years. The number of bus operators was different in each year due to issues of data availability. Their approach was to

establish a model of profit for one year and then to extend the model to other years. Profit per seat was the dependent variable in their model. The final model; profit per seat = *k* (mileage per bus) + average fare (passenger per seat) + constant; where k > 0, was proposed by the researchers. The researchers opined that a useful analysis of the profit of bus operators can only be done with the assumption that the operators seek to make or to maximize profit. Bly (1987) noted that almost all countries have found it necessary to regulate and control public transport operators. From one angle, the researcher says, such regulations are in the interests of safety and to avoid wasteful duplication of services. But from another angle, it is also to ensure that, in return for monopoly privileges, the operator would provide services in unprofitable routes as well as profitable ones, the profitable routes cross subsidizing the unprofitable routes. The researcher also noted that majority of transport policies concentrated on providing various forms of subsidies in order to improve services and bring down fares. But the injection of large amounts of public money into the transport operators in the form of subsidies led to the reduction of efficiencies and also easy acceptance of higher costs. This in turn effected the profitability of the transport operators.

Sankar, Mishra, & Nandagopal (1990) investigated whether state level public enterprises in India can earn a rate of return. They concluded that, in order to achieve the optimal rate of return and emerge as net earners, the state level public enterprises should initiate actions that would help them in improving their margin and turn over. They also prescribed that state level public enterprises should take up programmes for cost reduction and simultaneously look for the best ratio between cost and sales. These steps, they say, would help state level public enterprises in economising on labour, raw material and overhead costs. Banker, Chang, & Majumdar (1993) decomposed return on sales, into four components that capture the impact of productivity, price recovery, product mix and capacity utilization on a firm's profitability. They proposed 4 ratios, each related to the above components, which allows more micro-analytic details of performance that effect profitability to be analysed. In a similar manner, Banker, Chang, & Majumdar (1996) examined changes in profitability, productivity and price recovery of firms in the U.S telecommunications industry using a performance analysis model that disaggregates the profitability measure into two components; productivity and price recovery. The researchers noted that even if overall performance, as measured by the profitability margin, stays the same or doesn't change much, the underlying factors that influence profitability can change dramatically.

Singh (2001) and Singh (2014) examined the link between productivity, prices and profitability of Andhra Pradesh State Road Transport Corporation (APSRTC) and Uttar Pradesh State Road Transport Corporation (UPSRTC) respectively. It was found that the corporations had to pay much higher prices for the inputs than what it was able to receive from the outputs. This, despite the productive gains of 2.57 per cent and 3.33 per cent per annum respectively, led to the marginal decline in the profitability of the corporations. Similarly, Singh (2002) analysed economic profitability of major municipal transport undertakings of India. The analysis was done through an examination of the changes in their productivity and their ability to mark up prices above costs. But as the SRTUs are not in control of the prices, such an analysis cannot give desired results. Panel data of seven municipal transport undertakings for a period of 11 years was used for the analysis. A model was used to decompose changes in economic profitability into two components; capturing changes in productivity and the ability to recover price. The researcher noted that, even though there is a direct link economic profitability, productivity and prices, there are highly productive firms that are financially weak and also inefficient producers who make substantial profit. However, I question the sustainability and longevity of such conditions. The study found out that even though majority of the municipal transport undertakings increased their output prices at a greater rate than the rise in input prices, the decline in their productivities led to declining economic profitability.

Badami & Haider (2007) analysed the financial and operational performance of the public bus transit service in the four metropolitan centers and four secondary cities of India during the 1990s. Examination of financial performance was done in terms of traffic revenues and operating costs, profits and loss and financial ratios. The financial performance was further analysed in terms of bus productivity, labour productivity and fuel economy. Singh & Venkatesh (2004) perused the level as well as growth of productivity and economic profitability of Swargate depot of Maharashtra State Road Transport Corporation (MSRTC). The researchers found that the significant decline in productivity led to a 12 per cent fall in economic profitability. The study also revealed that taxes played a major role in deteriorating the financial performance of Swargate depot. Vanitha & Selvam (2011) used tools like ratio analysis, mean, standard deviation and ‘t’ test for evaluating financial performance of Indian manufacturing companies. The researchers used liquidity parameters, leverage parameters and profitability parameters in their study. Current ratio, quick ratio, net working capital and diversion of short term funds were used as liquidity

parameters. Leverage parameters used were total debt and equity to total assets, total borrowings and equity to EBITD and interest coverage ratio. Operating profit, net profit, ROI and net worth were used as profitability parameters in the study. Leepsa & Mishra (2012) also measured the financial performance on Indian manufacturing companies similarly. They used return on capital employed and return on net worth as profitability parameters. Current ratio, quick ratio and net working capital to sales as liquidity parameters. Leverage parameters used by the researchers were total debt ratio and interest coverage ratio.

2.2 Literature on Productivity

Productivity is the effectiveness of productive effort measured in terms of rate of output per unit of input. Solow (1957) remarked that even if 'output per unit of input' may seem to provide a relatively assumption-free way of measuring productivity change, the implicit load of assumptions is quite heavy. Abramovitz (1956) noted that the relation between the contributions of resource expansion and of productivity growth is more complicated than what our conventional measures can reveal. The economic theory of production has provides the analytical framework for most empirical research on productivity. The cornerstone of the theory is the production function which assumes a well-defined relationship between a vector of maximum producible outputs and a vector of factors of production (Nishimizu & Page, 1982). Caves, Christensen & Diewert (1982) proposed a framework, the Multilateral Index Procedure (MIP), for input, output and productivity measurement that proceed from a discrete time representation. The key to MIP is a notion of the Malmquist input, output or productivity index. Caves, Christensen, & Diewert (1982b) generalized the definitions for bilateral input, output and productivity comparisons to the multilateral case by implying the trans-log transformation function. Such indexes, according to the researchers, provide transitive multilateral comparisons that maintain a high degree of characteristicity. The superlative multilateral indexes proposed by the researchers are very attractive for cross section comparisons and for panel data comparisons.

Singh & Raghav (2013) measured the productivity of nine publicly owned Urban Bus Companies (UBCs) of India using their annual data from 2000-01 to 2010-11. MIP was used by the researchers to compute the growth and relative levels of Total Factor Productivity (TFP). Estimates of TFP were also compared with partial factor productivity indicators such as labour productivity

(passenger kilometers per employee), fuel productivity (bus kilometers per liter of fuel) and bus productivity (bus kilometers per bus held by the urban bus company). Similarly, Singh & Raghav (2014) examined the productivity and productive efficiencies of SRTUs of India during 2000s. In this case too, they made use of MIP to compute the growth and relative levels of TFP of the SRTUs of India. For the purpose of estimation, they used the annual data for a sample of eleven SRTUs that operated during the period 2000-01 to 2010-11. They found that there is a wide disparity among SRTUs according to their TFP and productive efficiency levels and growth. They also found a not very strong, but positive relationship between TFP and size of SRTUs.

In the economics and management literature, TFP is recognized as a robust measure of productivity. TFP is the portion of output not explained by the amount of inputs used in production. Historical analyses of TFP change, whether the non - parametric index number approach or the parametric approach, identify the change in TFP as the change in output levels controlling for input level. TFP measures the shift in production function by capturing the changes in the amount of output that can be produced by a given quantity of inputs (Hulten, 2001). Miller & Rao (1989) compared and contrasted two major profit-linked TFP measurement models at firm level. The total factor model developed by the American Productivity Center (APC) and the profit oriented model (PPP) used by the Ethyl Corporation were studied by the researchers. The y noted that even though APC and PPP models looked very similar, there are several significant differences in the two models.

Balakrishnan & Pushpangadan (1994) constructed a standard measure of productivity for Indian manufacturing industry. They provided estimates for TFP for aggregate manufacturing taking into account the changes in the relative price of material inputs. TFP was used by Singh (2000) to measure the gross productivity of 21 SRTUs for the period 1983-84 to 1996-97. The researcher pointed out that, the general concept of TFP is rooted on the amount of output that can be produced from a given amount of input. Therefore, TFP growth can arise both from an increase in the level of outputs from a given level of inputs or from a decrease in the level of inputs required to produce a given amount of outputs. To measure the gross productivities of the SRTUs, the researcher computed TFP index using MIP. The study found that there are wide disparities among the SRTUs in terms of their productive efficiency levels and growth. The study failed to take into account the differences quality of output, impact of public infrastructure and network structure. The researcher

also assumed that the quality of machinery and equipment, and the utilization of labour force is same for all SRTUs.

2.3 Literature on Efficiency

Efficiency is doing something or producing a desired result without wasting materials, efforts, energy, money and time. Gill & Sidhu (2002) pointed out that the ability to earn profits is not the only yardstick of efficiency. Hanumappa, Ramachandran, Sitharam, & Lakshmana (2015) attempted to quantify the performance of premium bus services operated by Bangalore Metropolitan Transport Corporation (BMTC). They estimated the efficiency scores for the different premium service depots and routes using Data Envelopment Analysis (DEA). The input variables included for DEA analysis were the following; (a) Fleet size as a measure of capital input, (b) Number of employees as a measure of labour input, (c) Fuel consumed as a measure of energy input and (d) Number of schedules and effective kilometers as a measure of network size. The output variables included were (a) Total revenue generated and profitability – ratio of earnings per kilometer and cost per kilometer as a measure of financial performance, (b) Vehicle utilization, Fleet utilization, Staff productivity, Breakdown rate and fuel efficiency (kilometers per liter) as a measure of operational effectiveness and (c) Accident rate as a measure of operational safety. Comparably, Karne & Venkatesh (2005) measured the technical efficiencies of six regions of MSRTC. They used DEA as panel data was available. The input measures used for the DEA study were quantity of labour, amount of High Speed Diesel (HSD) consumed per annum and fleet strength (as a proxy for the capital stock). The output measure was passenger kilometers. In a similar manner, Jha & Singh (2017) attempted to measure the efficiency and effectiveness of fifteen major STUs in India for the period 2003-04 to 2013-14 using DEA. They used a two output and three input model. Passenger kilometer and bus kilometer were the two outputs and labour/staff employed, fuel consumed and number of vehicles used were the input measures. The researchers also examined SRTUs' scale elasticity and its relationship with firm size. Vishnu & Kumar (2014) undertook the performance evaluation of road transport corporations using DEA. They used (a) salaries and allowances, (b) fuel and lubricant costs and (c) depreciation as input variables and used operating revenue as output variable.

Pal & Mitra (2016) measured the technical efficiency of 37 Indian SRTUs for the year 2012–13 using the Directional Distance Function (DDF) of DEA. DDF was employed as a tool for analysing a joint production function with both desirable and undesirable outputs. The comparison between the results with and without accidents showed that several SRTUs have experienced significant changes in their efficiency scores as well as in their rankings after accounting for the undesirable output. This indicated the importance of including the number of accidents as representative of the undesirable output in computing the efficiency scores of SRTUs. The results of the Tobit model indicated that SRTUs with greater vehicle productivity are more efficient under both conventional DEA and DDF approaches. The researchers also employed zero-truncated negative binomial model to assess the factors influencing the number of road accident experienced by the Indian SRTUs and found that the accident count was significantly influenced by fleet utilization and vehicle productivity. Venkatesh & Kushwaha (2017) examined short and long term efficiencies of select STUs in India over a period of 10 years. Fleet strength was used as the quasi-fixed input. The researchers tried to ascertain, through a comparison of shadow price of the quasi-fixed input with its market price, as to whether the quantity of this input is sub-optimally small or large. Another variant of DEA, the non-radial input oriented variant was used by Venkatesh & Kushwaha (2017a) in order to minimize the effect of slacks on the efficiency measure. The researchers found that the technical efficiency had fallen for SRTUs, on an average, and also noticed a fall in labour efficiency during the study period. A new variant of DEA was introduced by Ghiyasi (2019). This semi-additive (SA) technology provides a situation that a unit can consider collaboration with the other units, while it is compared with both individual and aggregated units.

Singh (2017), for ascertaining efficiency as well as the determinants of efficiency, estimated a stochastic production frontier based on a trans-log production function using the maximum likelihood method. DEA is non-parametric approach, whereas Stochastic Frontier Approach (SFA) is a parametric approach. The key difference of the two approaches is that, DEA makes relatively fewer assumptions regarding the underlying production technology as compared to SFA. Likewise, Viton (1986) estimated a stochastic frontier production function for urban bus transport in such a way as to avoid simultaneous equation bias and at the same time to examine technical and allocative efficiencies. The researcher used 4 input variables: (a) driver man-hours, (b) labour man-hours, (c) fuel consumed and (d) fleet size. Number of vehicle kilometers was used as the output variable. Bhattacharyya, Kumbhakar, & Bhattacharyya (1995) used the stochastic cost frontier

approach to estimate the determinants of cost inefficiency of several publicly operated passenger bus transportation companies in India in terms of their ownership structure as well as other firm-specific characteristics. Panel data on publicly operated passenger bus transportation companies was used to estimate a trans-log cost system with inefficiency. Inefficiency was specified in such a way that both its mean and variance are firm-specific and time-specific. For the estimation of production technology and cost inefficiency the researchers used a multi-step estimation procedure instead of the single-step maximum likelihood (ML) method. In the first step the researchers estimated the trans-log cost system with heteroskedastic cost function without using any distributional assumptions on the error terms. The second stage used the ML method to estimate the parameters associated with inefficiency, conditional on the parameter estimates obtained from the first stage. Finally, the residual of the cost function was decomposed to obtain firm-specific and time-specific measures of cost inefficiency, with ownership type and other firm-specific characteristics as explanatory variables. Similarly, Jha & Singh (2001) estimated a stochastic cost efficient frontier based on trans-log cost function using ML methods to examine the issue of inefficiency as well as technical characteristics of the SRTUs. Annual data of 9 SRTUs were used by the researchers for this purpose.

To examine the relationship of cross sectional rankings of individual SRTU's productive efficiency estimates, Singh (2000) calculated Kendall's index of rank concordance along with coefficient of variation of residual TFP. This was done to determine if there was any convergence in the SRTUs that were inefficient earlier. In a similar procedure, Singh & Raghav (2014) calculated the productive efficiency estimates of Indian SRTUs during the 2000s by separating the effects of variations in the variables beyond managerial control from the TFP measures. Examination of the temporal relationship of the cross-sectional rankings of individual SRTUs' productive efficiency estimates was also done by the researchers. For this, they calculated Kendall's index of rank concordance along with coefficient of variation of productive efficiency estimates. The same procedure was followed by Singh (2017).

Some other methodologies also were used by researchers to measure efficiency. Kalirajan & Shand (1996), in their study regarding public enterprises of India, used the unconstrained Cobb-Douglas model to estimate enterprise-specific technical efficiency. The researchers used maximum likelihood estimation to estimate the coefficients of the frontier production functions and the

parameters of the distributional form of technical efficiency. Sunny (1990) analysed the efficiency of different modes of transport in Kerala in his research. He assigned ranks to the different modes of transport in the area of capital structure, capacity utilization, fuel efficiency, flexibility and speed. The researcher concluded that inland water transport has benefits to offer which are not being adequately exploited due to government neglect. The researcher appealed for the revival of inland water transport and to increase the share of rail traffic in order to remove the high burden on the road transport system.

2.4 Literature on Cost Analysis

Cost is the value of money that has been used up to produce something or to deliver a service. Costs are the necessary expenditures that must be made in order to run a business. Every factor of production has an associated cost. Cost analysis is the act of breaking down a cost summary into its constituents and studying them for the purpose of managerial decision making. Johnston (1956) undertook a statistical investigation of the relationship between output and costs in a single road passenger firm over a period of time. The researcher also studied the relationship between scale, costs and profitability in a cross section of firms for a period of time. The results of the study showed the short-run average cost to be a decreasing function of output over the whole of the output range. Also there were slight suggestions like (a) long-run average costs decline with output and (b) profits per vehicle mile decline with firm size. But both of them were statistically insignificant. Miller (1970) proved that the city setting (environmental setting in which the bus firm operates), should be considered when estimating the costs of urban bus transportation. All three variables used by the researcher to describe the city setting – schedule speed, city age and intensity (total annual vehicle-mileage per number of route miles served) were statistically significant at 1 per cent level.

Wilson (1977) stated that a necessary part of transit planning is to estimate the costs of proposed transit systems whether the systems be entirely new or extensions of the existing ones. The researcher went on to develop cost models for each of the five components of total operating cost (driver wages, bus repair labour, fuel, lubricating oil and other operating costs) in order to estimate costs of operating buses in U.S. cities. The models were intended for use rather late in the planning process. Model inputs included annual bus miles and annual bus hours. Model outputs were in

terms of cost per unit, output units being either a bus mile or bus hour. The least squares regression analysis was the statistical technique used in the study.

Viton (1981) noted that when the full cost of providing trips on different modes are compared at different traffic volumes, bus transit is less costly than rapid-rail transit. Full cost include out-of-pocket costs of the providers of the service, the time cost incurred by the users of the transit system and the external costs that the users impose on each other as well as the rest of the economy. In other words, full cost is the full resource cost of providing trips. The researcher went on to specify and estimate a trans-log approximation to an arbitrary cost function for urban bus transit. The researcher claimed that the proposed trans-log form has the advantage of containing all the relevant economic information via its value, first and second derivatives, without imposing untested and restrictive assumptions as to functional form and economic effects. The relationship between cost conditions and the level of service and prices of inputs for publicly owned urban bus systems was evaluated by Williams & Dalal (1981). They remarked that the common function forms used in the estimation of urban bus transportation cost functions, the linear and log linear forms, are quite restrictive in terms of the implied restrictions on the production technology. So, they chose the transcendental logarithmic cost function which allows for changing scale economies.

Berechman (1983) sought to understand the economic structure of bus transport with a view to evaluate the effect of public policies on public bus transport. The researcher proposed a cost function approach to empirically estimate production conditions the cost structure of bus transport. Berechman & Giuliano (1984) estimated a general cost model which places very few restrictions on the production structure. They used time series data from a major bus transit operator for the estimation. Also, they defined two different output measures, namely, vehicle miles and revenue passengers and estimated cost models for each of them separately. The input measures used in their study were capital (total number of buses in fleet), labour (paid labour hours of driver, clerical and non-union employees), maintenance (paid labour hours of maintenance) and fuel (gallons of diesel fuel). The study showed that the nature of data sample and the output measure have a significant effect on the results of an econometric analysis of bus transit.

Tauchen, Fravel, & Gilbert (1983) estimated a multiproduct cost function for the production of intercity bus services for examining three issues. The first was whether there were cost advantages

in large scale production of intercity buses. The second was whether the marginal costs of regular-route, charter, local and school bus-miles were identical. The third was whether there were cost advantages in joint rather than specialized production of the services. The estimated cost function had a trans-log type functional form. Trans-log type function, similar to trans-log function, is a flexible functional form with second order terms in the output and input measures. The study found that the economies of scale in the production of intercity bus miles are exhausted at an output level which is very small fraction of the total output of the industry. The marginal costs of regular route, charter, local and school bus miles were found to be not identical. Also it was found that the different types of services can be produced at lower cost jointly than separately.

Similar to Viton (1981), Jakob, Craig, & Fisher (2006) estimated the total cost of both private and public transport by using a case study of Auckland. Their study found that the private transport generated 28 times more external cost than public transport. Also, the internal cost assessment showed total revenues collected did not even cover 50 per cent of total transport costs. The researchers concluded that the solution to the transport problems of Auckland is to develop an efficient public transport system combined with a private transport system that pays more of its external costs. They also suggested that reducing and internalizing external costs would lead to decisions that are more efficient in economic, environmental, administrative and social aspects. Singh (2014) examined the cost elasticities, returns to scale, marginal cost of production, technological progress, demand for factors of production and factor substitution of SRTUs. A trans-log cost function was estimated jointly with factor share equations subject to required coefficient restrictions by using the method of Zellner's iterative technique using the annual data of 11 SRTUs for this purpose. The study found that the technological progress or pure productivity effect does not depend on the factor prices and the level of output. The study also found that the firms operating at sample mean of output is subject to diseconomies of scale.

2.5 Literature on capital structure and its effect on financial performance

Capital structure refers to the proportions or combinations of different sources of funds used by a firm to finance its overall operations and growth. The basis of the modern thinking of capital structure comes from the Modigliani-Miller theorem proposed by Franco Modigliani and Merton Miller in 1958. Modigliani & Miller (1958) stated that, in a perfect market, how a firm is financed is irrelevant to its value. They made two propositions under perfect capital market conditions. The

first one was that the value of a company is independent of its capital structure. Their second proposition stated that the cost of equity for a leveraged firm is equal to the cost of equity for an unleveraged firm, plus an added premium for financial risk. That is, as leverage increases, risk is shifted between different investor classes, while total firm risk is constant, and hence no extra value is created. Modigliani & Miller (1963) noted that the existence of a tax advantage for debt financing does not necessarily imply that corporations will try to use the maximum possible amount of debt in their capital structures. Miller (1977) argued that even if interest payments are fully deductible in computing corporate income taxes, the value of the firm, in equilibrium will still be independent of the firm's capital structure. The best debt-to-equity ratio that minimizes a firm's cost of capital and maximizes its value is called optimum capital structure. Schwartz & Aronson (1967) empirically proved that various class of industries have developed optimum financial structures conditioned by the intensity of their operational risks and by the characteristics of the industry asset structure. The analysis done by Brennan & Schwartz (1978) to study the effects of corporate income tax on the relationship between capital structure and valuation, led to the conclusion that an optimal capital structure will consist almost entirely of debt. But this conclusion doesn't go well together with the premise that managements act so as to maximize wealth of shareholders. This inconsistency was attributed by Modigliani and Miller to; (a) the effects of personal income tax, which makes retained earnings a cheaper source of finance than debt and (b) to the need of preserving flexibility. Robichek & Myers (1966), however, suggested that bankruptcy costs may be the reason for low levels of leverage. This claim was supported by Jensen & Meckling (1976) and they also added that the managements are more interested in their own job security and other agency costs than they are in the maximization of the shareholder's wealth.

Two main benefits of debt for a firm are tax shield and disciplined managers. Debt motivates managers and their organizations to be efficient (Jensen, 1986). And such efficiency leads to better firm performance. The relationship between capital structure and firm performance has received immense attention and there are innumerable papers in this particular area in the finance literature (Fosu, 2013; Park & Jang, 2013; Taani, 2013; Ahmad, Abdullah, & Roslan, 2012; Khan, 2012; Pouraghajan, Malekian, Emamgholipour, Lotfollahpour, & Bagheri, 2012; Salim & Yadav, 2012; Bistrova, Lace, & Peleckienė, 2011; Foroughi & Fooladi, 2011; Ebaid, 2009; Akintoye, 2008; Zeitun & Tian, 2007; Abor, 2005; Simerly & Li, 2000; Majumdar & Chhibber, 1999; Kochhar,

1997; Chaganti & Damanpour, 1991; Chang & Choi, 1988; Armour & Teece, 1978; Newman, 1978; Monsen, Chiu, & Cooley, 1968). Almost all researches in this area used performance measurement concepts like Return on Assets (ROA), Return on Equity (ROE), Return on Capital (ROC), Earnings per Share (EPS), operating margin, net margin, net profit ratio etc. as dependent variables and capital structure measurement concepts like Total Debt (TD), Short Term Debt (STD), Long Term Debt (LTD), Debt to Capital (DC), Long Term Debt to Capital (LTDC), Debt to Asset (DA), Debt to Equity Market Value (DEMV), Debt to Common Equity (DCE) etc. as independent variables. These dependent and independent variables were regressed by the researchers to analyse the degree of variation in performance of firms which is being explained by the changes in the capital structure of the firms.

3. Problem Statement

Bus-based public transport is the most used public transport mode in India. The SRTUs is the dominant player in the bus-based transport system of India. Of the 47 SRTUs whose financial performance data is available, 40 of them reported to have incurred massive losses. Such huge losses cannot be rationalized with the argument of providing social services. These losses may be an indication of the presence of fundamental flaws in the management and operations of the SRTUs of India. For the progress of the nation and the well-being of its people, it is imperative that SRTUs survive and continue to operate. So it is of utmost importance to find out, what really is wrong with the SRTUs. And hence this research.

4. Objectives of the study

1. To identify the major determinants of financial performance and profitability of SRTUs of India.
2. To evaluate the productivity levels of various components of SRTUs of India.
3. To measure the efficiencies of various components of SRTUs of India.
4. To undertake the cost analysis of SRTUs of India.
5. To study the capital structure and its impact on the financial performance of SRTUs of India.

5. Research Methodology

5.1 Data

Due to the unavailability of comprehensive data, the data of SRTUs before the financial year of 2006-07 cannot be used in the study. So the data used for the study pertains to the financial years from 2006-07 to the latest year of which data is published. As of now, the latest published data pertains to the financial year 2015-16. But it is expected that 2 more years of data will be published by the time this study is completed. This study is based on secondary data published on an annual basis. The data required for the research is collected from the annual publications of CIRT "STUs: Profile and Performance" from the financial year 2006-07 to latest available year.

5.2 Methodology

The review of the existing literature in the area of study gave ideas about the methodologies to be used to analyse the data and also about the manner in which to present the findings of the analysis. For analyzing the financial performance and profitability of SRTUs, liquidity parameters (current ratio, quick ratio, net working capital, net working capital to sales, diversion of short term funds etc.), leverage parameters (total debt and equity to total assets, total borrowings and equity to EBITD, interest coverage ratio etc.) and profitability parameters (operating profit, net profit, ROI, net worth, return on capital employed, return on net worth etc.) will be used (Badami & Haider, 2007; Leepsa & Mishra, 2012; Vanitha & Selvam, 2011). Productivity of SRTUs will be measured using TFP index computed with the help of MIP (Singh & Raghav, 2014, 2013; Singh, 2001; Caves et al., 1982). DEA will be used to measure the efficiency of SRTUs (Ghiyasi, 2019; Jha & Singh, 2017; Singh, 2017; Venkatesh & Kushwaha, 2017a; Pal & Mitra, 2016; Hanumappa et al., 2015; Vishnu & Kumar, 2014; Karne & Venkatesh, 2005). The analysis of cost will be done using trans-log cost function (Berechman, 1983; Tauchen et al., 1983; Williams & Hall, 1981). Capital structure of SRTUs and its effect on the financial performance will be evaluated using performance measures (ROA, ROE, ROC, operating margin, net margin, net profit ratio etc.) and capital structure measures (TD, STD, LTD, DC, LTDC, DA, DEMV, DCE etc.). Further, the study will also make use of descriptive statistics, cross-sectional and panel regression analysis, parametric and non-parametric tests for analysis.

6. Scope of the study

This study focuses on investigating the financial performance, profitability, productivity, efficiency, costing and capital structure of SRTUs of India. There are currently 54 SRTUs in India. Of these, 47 SRTUs report their financial parameters to the TRW of MoRTH. The rest of them cannot be included in the study due to the unavailability of data. The 47 SRTUs included in the study, pertains to 25 states and 3 union territories of India. Annual data from 2006-07 to the latest year of published data, is used for the study. The required data is collected from the annual publications of CIRT "STUs: Profile and Performance".

7. Chapter Scheme

The thesis will be presented in six chapters. The description of each chapter is as follows:

Chapter 1: Introduction

This chapter will contain the introduction to the study, need for the study, objectives of the study, hypotheses, research methodology, scope of the study and the chapter scheme.

Chapter 2: State Road Transport Undertakings of India

This chapter will contain the history, profile and discussions on the SRTUs of India.

Chapter 3: Review of Literature

This chapter will contain the findings of various previous studies related to SRTUs. This chapter will be further divided to the following five sub sections.

Literature on financial performance and profitability,

Literature on productivity,

Literature on efficiency,

Literature on cost analysis and

Literature on capital structure and its effect on financial performance.

Chapter 4: Analysis of Operational Performance

This chapter will contain the detailed description of the data and methodology used for the analysis of the operational performance of the SRTUs. The chapter will be divided into the following sub sections.

Analysis of Productivity of SRTUs

This sub section will contain the detailed description of the data and methodology used for the analysis of productivity of various components of the SRTUs.

Analysis of Efficiency of SRTUs

This sub section will contain the detailed description of the data and methodology used for the analysis of efficiency of various components of the SRTUs.

Chapter 5: Analysis of Financial Performance

This chapter will contain the detailed description of the data and methodology used for the analysis of the financial performance of the SRTUs. The chapter will be divided into the following sub sections.

Analysis of determinants of financial performance and profitability of SRTUs

This sub section will contain the detailed description of the data and methodology used for the analysis of determinants of financial performance and profitability of the SRTUs.

Cost Analysis of SRTUs

This sub section will contain the detailed description of the data and methodology used for the cost analysis of SRTUs.

Analysis of Capital Structure of SRTUs

This sub section will contain the detailed description of the data and methodology used for the analysis of capital structure of SRTUs.

Chapter 6: Summary and Conclusions

This chapter will contain the summary of the findings of the empirical analysis, the conclusions drawn from the study and also the suggestions made by the researcher to the SRTUs of India. Potential areas/themes for future research will also be included in this chapter.

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